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CONTACT DUPLICATING AND RESEAU PRINTER

AND

HIGH RESOLUTION STEP AND REPEAT PRINTER

TENTH MONTHLY LETTER REPORT

MAY 10, 1965

Period: April 1, 1965 to May 1, 1965

NGA Review Complete

STAT

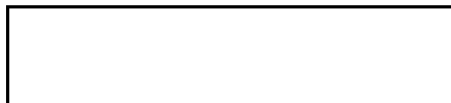


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1.0 CONTACT DUPLICATING AND RESEAU PRINTER

1.1 Purpose

The overall objective of the current contract is the design, fabrication, test, and delivery in fifteen months of a photographic Step and Repeat contact duplicating and Reseau Printer. Prime design goals are high speed automatic operation, variable format capability, and high resolution with minimum film distortion or damage. The deliverable equipment will be suitable for operational use. The Printer will accommodate films of 70 mm to 9-1/2" width with frame lengths up to 30 inches and will offer operation in the Reseau mode and Selective mode as options.

1.2 Activity of this Report Period

Weldment of the Printer framework is now complete, and mounting of component assemblies has been initiated. Final drawings by are approximately 80% complete. Areas yet to be completed are electronic circuitry for automatic exposure control, skin construction and fastening, and specific dimensions and details of the optical exposure system.

An improvement in the optical system by reducing lamp-to-platen distance and adding Plexiglas lenses has resulted in more than adequate printing and sensing illumination. Capability for resolution, dodging, and uniformity is retained in the new configuration.

Reseau line tests using the recently acquired sample from [] STAT
[] will be accomplished [] using a 36-lamp breadboard. STAT

Glass blanks for the Reseau and clear platens have been ordered
from [] and a purchase order for the actual Reseau Grid
fabrication is contemplated upon analysis of the photographic
tests []

At a meeting with [] STAT
[] on April 14 and 15, agreement was reached on many details
concerning skin construction, filter placement and the Pre-
View and Punch Station. Comments from [] were also STAT
received with regard to clean-room operation, construction, and
maintenance.

Details of the electronic circuitry for automatic exposure
control are being resolved by a joint effort of [] STAT
[] engineers. A demonstration of circuitry at
[] was held for [] and, subject to some refinement,
may be accepted [] in lieu of his electro-mechanical device
for photocell adjustment.

The Test Plan has been reviewed and revised several times and
is being prepared in final form for submission to the contract
monitors.

1.3 Plans for Next Report Period

Final design and fabrication of the deliverable printer will be continued.

Testing will continue on the full scale exposure system toward determination of the final selection of sensing components and circuitry. The test plan will be prepared in final form. Test targets will be procured and final test target fabrication will be initiated.

1.4 Problems

Determination of optimum sensor and circuit design. Program status is presently being reviewed to determine effect on price and delivery resulting from the excessive time taken for Design Plan review and approval.

1.5 Documentation

There was no new documentation this month.

1.6 Questions Outstanding

There are no outstanding questions.

2.0 HIGH RESOLUTION STEP AND REPEAT PRINTER

2.1 Purpose

The purpose of this effort is to design, fabricate, test and deliver in twenty months a high-precision Step and Repeat Photographic Contact Printer. This Printer will be capable of producing photographic contact prints of the highest possible quality, resolution and acutance from roll films of width varying from 70 mm to 9-1/2 inches and in preselected frame lengths from 2-1/4 inches up to a maximum of 30 inches.

2.2 Activity of this Report Period

Procurement and fabrication for the breadboard is nearing completion, and assembly is well underway. Some testing has been started.

STAT Extensive meetings were held with the technical monitor in Washington and at [] to define and clarify the new direction of the program based on the customer's elimination of the film coding requirement and the addition of a need for frame separation sensing. Specification changes by the technical monitor and revised by [] resulted in complete unanimity. STAT Cost estimates for program completion are now in progress.

2.2.1 Exposure Control and Light Source

The optical components have been procured and the lamphouse assembly is nearing completion. Energy uniformity tests along the length of the lamp aperture have been performed and indicate evenness variations from 10% at 775 milliamperes to 40% at 30 milliamperes. Clouding and fluttering effects that were noticed at low currents have been eliminated by keeping the heater filaments energized.

Continued tests to study the effects of wall temperature are being performed. An early meeting with engineers is being planned to discuss lamp variations and experimental results. The log amplifier and sensor circuitry has been breadboarded and pre-tested, and is available for use. STAT

The D.C. modulator circuit performance has been improved by changing from shunt to series modulation. Lamp current has been modulated successfully up to about 5000 cps. A back-up modulator and power supply was breadboarded for high frequency A.C. operation of the exposure lamps. Initial tests have been encouraging, and may indicate that a higher degree of reliability will be achieved by operating the lamps on A.C. instead of D.C.

2.2.2 Film Gate and Scan Drive

Rolling Air Bag

Preliminary tests indicate that the unit pressure needed for high resolution contact printing will be obtained. It has been observed that a Newton Fringe pattern is formed, also indicating good pressure distribution. It is anticipated that the continuous motion of the pattern will reduce or eliminate these effects when printing. All of the parts are in, and final assembly is in process.

Vacuum Capstan

The two capstans are assembled and operating. Initial tests showed some drag due to deflection of the outer rotating shell. This difficulty will be eliminated by reworking the inner core to provide increased clearance for the rotating shell.

Gate and Scan Drive

The gate and scan drive assembly is 90% complete, and should be completed early in May. There have been no problems associated with this major assembly and testing should start approximately on schedule.

2.2.3 Film Transport

All parts have been received and the Spool Drive, Transformer, and Storage Loop assemblies have been assembled to the bread-board frame. Preliminary testing has been started, but is awaiting the storage loop amplifier, which is nearing completion by the vendor.

Design analysis of the storage loop response by analog simulation has provided the necessary parameters for spool damping, which will be designed into the storage loop system.

The delivery of the storage loop amplifiers and completion of the transport servo-control will initiate full scale transport testing in approximately two weeks. *Mid-May?*

2.2.4 Film Viewer

A number of manufacturers have been contacted for demonstration of closed circuit T.V. and Image Converter Tube systems. A 9-1/2" x 30" illuminated breadboard "platen" has been mocked up to be used with these demonstrations.

A direct viewing scheme has been designed, which appears feasible, but would require extensive modifications to be made in the duplicating film transport, and has, therefore, been shelved. An alternate scheme utilizing a red-light viewer was mocked up and examined in the darkroom. It appears to be unfeasible from a human factors standpoint and has also been shelved. Other techniques are being investigated, but at present the electronic schemes seem to have the most merit, requiring the least amount of modification.

2.2.5 Control Electronics

The control electronics has been considerably altered as a result of the deletion of the film coding and external programming features. A new control panel, which will provide

more manual capabilities, has been started and operator control functions have been defined. A substantial amount of electronic modification will be required to implement the change of scope, and a new human factors study of the control panel will be initiated.

2.3 Plans for Next Reporting Period

Most breadboard assemblies should be completed and full scale breadboard testing started for the transport, gate and lamp-house assemblies.

2.4 Problems

Problems presently exist in evenness of lamp illumination. The lamp manufacturers have been contacted and it is anticipated that either modification of lamp electronic drive techniques or of the lamp internal structure will alleviate the problem.

Approximately one month after the submission of the Feasibility Study for the High Resolution Step and Repeat Printer, [] received verbal instruction that the Government was going to alter the specifications. Since then, meetings between the Government Technical Monitor and [] technical personnel have resulted in a revised specification. However, to date there has been no official notification of a specification change.

STAT

*Our STAT
is dated
13 April '65*

Therefore, once [] has received formal notification of the specification revision, we will prepare a revised cost to completion and will notify the Government of the effect on price and delivery.

STAT

2.5 Documentation

At a meeting with the technical monitor at on April 13 and 14, the following took place:

STAT

2.5.1 Data on film widths and lengths were submitted by the technical monitor in the form of a specification sheet.

2.5.2 Technical monitor agreed to the rewrite of paragraph 2.1.3, Frame Selection, as a modification to the specifications. This will be confirmed after verification with technical people in Washington.

Our STA
is dated
16 April 63

2.5.3 Technical monitor indicates that for every roll of negative film, a fixed, finite frame length will be defined. Space between the frames may contain clock image, coding, identification, etc.; therefore, photo-sensors for frame edge sensing should not be confused by information in margins.

7 Do not
use

2.5.4 Ambient conditions of facility for the printer; temperature, 70° - 80°F.; R.H., 50 - 70%.

2.5.5 A letter from the customer indicating non-marking of film is forthcoming.

Our Memo
is dated
16 April 63

2.5.6 The exhaust vent from the printer will be at a negative pressure.

Negative
is at 7. Room?
TROUBLE

2.5.7 Cubicles for printing equipment will have tungsten lighting and safe-lighting for interchangeable usage. Normal operation of the Printer will be safe-lighted so the operator will not be subjected to frequent changes in illumination level. The Control Panel will not necessarily have to be safe-lighted since no other sensitive equipment will be in the same room. The possibility of interlocking room lights with Printer was discussed, and the technical monitor will investigate the desirability.

*checked with Jack D.
"Not practical to connect"*

2.5.8 Technical monitor requested Recommended Spare Parts List for Printer along with the complete contractually required Operations and Maintenance Manual.

2.5.9 Technical monitor confirmed that Printer No. 2 would not be a clean-room operation similar to Printer No. 1. It was suggested that the film be cut by using a (GEM) single-edged razor blade with an adjacent vacuum manifold to pick up chips.

*1677
OK
Jack D.*

2.5.10 Technical monitor requested that microdensitometer test records be made of resolution targets from the deliverable printer so as to check performance after prolonged use in facility.

2.5.11 Technical monitor indicated that resolution equal to that of normal eyesight is sufficient for the viewer (5-6 lpm.). No preference as to method of viewing was expressed.

2.5.12 Viewing of the entire frame is not absolutely necessary. *Not at one time, scanning is necessary.*

2.5.13 Lateral rotation of the viewer would be acceptable. *Would be able to "flip" images R+L, up & down.*

2.5.14 Masking technique: Manual control of the mask is desired for external control. It may be necessary to exclude some data on border on margin. A flip-flop device may possibly be utilized.

2.5.15 Modular spacing or grouping of controls by function was suggested by the technical monitor for the Control Panel.

2.6 Questions Outstanding

2.6.1 Technical monitor will determine if facility will have voltage regulator or, if not, the range of voltage to be expected.

STAT

2.6.2 submitted the Feasibility Study for the High Resolution Step and Repeat Printer on January 19, 1965. Therefore, due to this reasonable review period, requires the immediate approval of the Feasibility Study in order to avoid possible delivery delays, and the possibility of additional costs.

STAT

Phone call with on 17 May 65. RFD: "Whether approval of review is in the way -- do you need separate approval of Feas. Report?" CDM: "Yes"

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Approved For Release 2005/02/17 : CIA-RDP78B04770A001600040016-5

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